BUILDING 707/707A DECOMMISSIONING BASIS FOR INTERIM OPERATION (DBIO)

CHAPTER 5

HAZARD IDENTIFICATION AND ANALYSIS

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5. HAZARD IDENTIFICATION AND ANALYSIS

This chapter presents the methodology and results of the hazards identified and evaluated for Building 707/707A Decommissioning Basis for Interim Operations (DBIO) activities. The basic methodology applied to the Building 707/707A DBIO hazard analysis relies on a Preliminary Hazards Analysis (PHA) approach to the identification and initial evaluation of hazards.

5.1 HAZARDS ANALYSIS METHODOLOGY

Hazards, defined by *SARAH* (Ref. 5-1), are any source of danger (i.e., material, energy source, or operation) with the potential to cause illness, injury, or death to personnel, or damage to the facility or the environment. The methodology described in Subsection 5.1.1 was used to identify and evaluate the hazards associated with Building 707/707A activities.

5.1.1 Hazards and Accident Methodology

An initial or preliminary analytical effort conducted for Building 707/707A was the *Building 707 PHA* (Ref. 5-2). Since Revision 1 of the BIO, the PHA has been updated to support development of this DBIO by incorporating decommissioning activities into the hazards analysis. The update effort for the PHA was limited to: 1) revising/consolidating the conclusions presented in the previous revision to incorporate changes in the analytical tools (i.e., RADIDOSE and SARAH); 2) changes associated with the application of Evaluation Guidelines as directed by the U. S. DOE (Ref. 5-3); and 3) the inclusion of decommissioning activities for hazards evaluation.

Using the PHA process, the facility's hazards were identified systematically and comprehensively. Consideration was given to the potential for accidents associated with Building 707/707A activities that could involve the identified hazards. A simplified flow diagram of the hazard analysis process used for the Building 707/707A DBIO is illustrated in Figure 5-1. A more detailed description of this process follows.

A multi-disciplinary team of individuals including safety analysts, nuclear safety, facility personnel, and SMEs conducted the PHA. Collectively, the team completed the following preparatory activities.

- Data collection that encompassed review of existing documentation [e.g., existing TSRs, compliance and Limiting Condition of Operation (LCO) tracking, design basis documentation, Occurrence Reports, FHAs, Health and Safety Plans, operational procedures, USQDs/Justifications for Continued Operations (JCOs), and facility walkdowns (including interviews with building personnel and completion of hazards checklists)];
- Defining facility boundaries to facilitate the analysis; and
- Defining current and projected activities to be evaluated.

The two basic analytical activities in the conduct of the Hazard Analysis were hazard identification and hazard evaluation. While identifying and evaluating the hazards, the Hazard Analysis team considered the complete spectrum of hazards and accidents (excluding standard industrial accidents that are programmatically controlled by the facility such as falls, cuts, electrical, etc.) that could initiate a release of radioactive or otherwise hazardous materials or that could worsen the consequences of potential releases. The approach used to perform the two basic hazard analysis activities is described in Subsections 5.1.1.1 and 5.1.1.2.

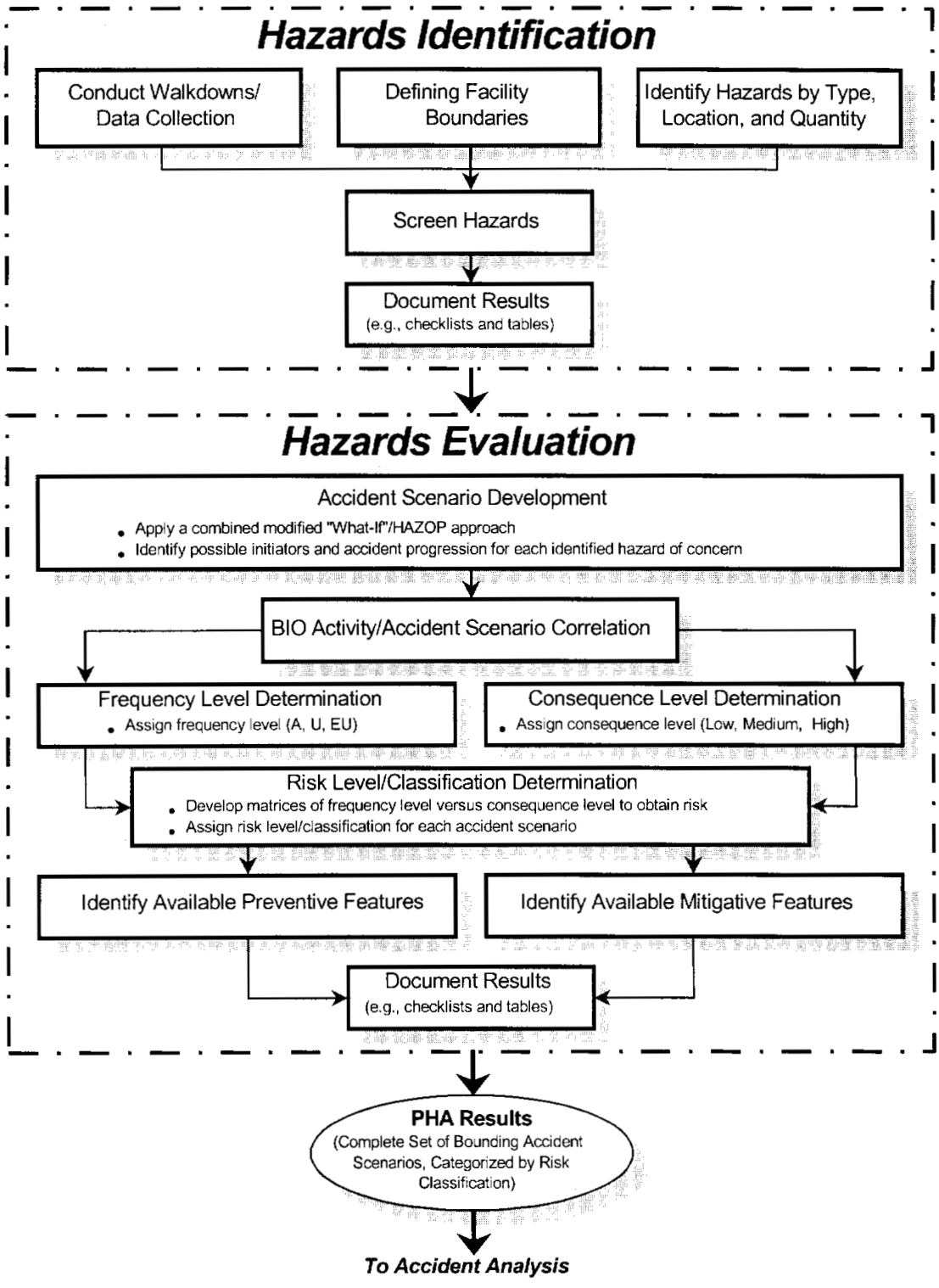

FIGURE 5-1. PHA METHODOLOGY SIMPLIFIED FLOW DIAGRAM

5.1.1.1 Hazards Identification

Hazards identification is a comprehensive, systematic process by which all known facility hazards (hazardous material and energy sources) are identified, recorded, and screened. The primary method of hazard identification, as used for this DBIO, involved developing lists of hazardous energy and hazardous material sources and their locations within the complex with respect to other energy sources. The *SARAH* Hazard Checklist, which was modified as shown in Table 5-1, aided this process, particularly to minimize the potential for oversights and to ensure completeness. A checklist similar to Table 5-2 was used in the PHA to correlate hazardous energy material sources to accident types and categories defined in *Nonreactor Nuclear Facilities: Standards and Criteria Guide* (Ref. 5-4).

TABLE 5-1. HAZARDOUS ENERGY AND MATERIAL SOURCES

Hazard Type	Hazard Energy Source	
Electrical	Battery Banks	Pumps
	Cable Runs	Power Tools
	Diesel Units	Switchgear
	Electrical Equipment	Service Outlets and Fittings
	Motors	Transformers
	Heaters	Transmission Lines
	High Voltage	Underground Wiring
	Locomotive (electrical)	Wiring
Thermal	Boilers	Lasers
	Electrical Equipment	Steam Lines
	Electrical Wiring	Welding Surfaces
	Welding Torch	Furnaces
	Heaters	Engine Exhaust
Kinetic-Linear and Rotational (Friction)	Belts	Gears
	Bearings	Grinders
	Carts	HVAC Blowers of Fans
	Centrifuges	Motors
	Cooling Tower Fans	Power Tools
	Crane Loads (in motion)	Presses
	Dollies	Shears
	Drills	Saws
	Fans	Vehicles
	Fork Lifts/Lift Tables	
Pyrophoric Material	Pu/U Metal	Pu

TABLE 5-1. HAZARDOUS ENERGY AND MATERIAL SOURCES (continued)

Hazard Type	Hazard Energy Source	
Spontaneous Combustion	Cleaning/Decon Solvents	Grease
	Diesel Fuel	Nitric Acid and Organics
	Gasoline	Paint Solvents
Open flame	Welding/Cutting Flames	
Flammables	Cleaning/Decon Solvents	Lube Oil
	Compressed Flammable Gases	Natural Gas
	Diesel Fuel	Paint Solvent
	Flammable Gases	Propane
	Flammable Liquids	Spray Paint
	Gasoline	Welding/Cutting Gases
Combustibles	Combustible Materials	Plastics
	Paper/Wood Products	Petroleum-Based Products
Chemical Reactions	Uncontrolled Chemical Reactions	
Potential (pressure)	Autoclaves	Gas Receivers
	Boilers	Heated Surge Tank
	Coiled Springs	Pressure Vessels
	Furnaces	Steam Headers and Lines
	Gas Bottles	Stressed Members
Potential (height mass)	Cranes	Loading Docks
	Elevated Doors	Mezzanines
	Elevated Work Surfaces	Pits
	Elevators	Scaffolds and Ladders
	Hoists	Stairs
	Jacks	Trucks
	Lifts/Lift Tables	Vessels
Explosive/Pyrophoric Material	Caps	Nitrates
	Dusts	Peroxides
	Dynamite	Pu/U
	Electric Squibs	Potassium
	Explosive Gases	Primer Cords
	Explosive Chemicals	Propane
	Hydrogen (batteries)	Sodium
	Hydrogen	Superoxides
Radiological Material	Burial Grounds	Radiological Material
	Canals, Basins, or Outfalls	Receiving Areas
	Casks or Overpacks	Research and Development Labs
	Filter Plenums	Shipping Areas
	Gloveboxes	Storage Racks
	Hoods	Storage Vaults
	Hot Cells	Transport Conveyors
	Laboratories	Ventilation Ductwork

TABLE 5-1. HAZARDOUS ENERGY AND MATERIAL SOURCES (concluded)

Hazard Type	Hazard Energy Source	
Hazardous Material	Acetone	Dusts and Particles
	Alkali Metals	Fluorides
	Ammonia and Compounds	Herbicides
	Asphyxiants	Insecticides
	Bacteria	Lead
	Beryllium and Compounds	Metal Plating
	Biologicals	Other Toxins
	Carcinogens	Oxidizers
	Chlorine and Compounds	Sandblasting Particles
	Corrosives	Trichloroethylene
	Decontamination Solutions	Viruses (pathogenic)
Ionizing Radiation Sources	Contamination	Radioactive Material
	Critical Masses	Radioactive Sources
	Electron Beams	Radiography Equipment
	Fissile Material	X-Ray Machines
Fissile Material	Fissile Material	Fissionable Material
Non-Facility Events	Aircraft Crash	Other
	Explosion	Power Outage
	Fire	Transportation Accident
Vehicles in Motion	Airplane	Helicopter
	Forklifts/Lift Tables	Truck/Car
	Heavy Construction Equipment	Train
Crane	Crane	Crane Loads
Natural Phenomena	Earthquake	Snow and Freezing Weather
	Flood	Straight Wind
	Lightning	Tornado
	Rain/Hail	

TABLE 5-2. CORRELATION OF HAZARDOUS ENERGY AND MATERIAL SOURCES TO ACCIDENT TYPES/CATEGORIES

Accident Category*	Hazard Energy and Material Source Groups**	
E-1: Fire	Electrical Thermal Friction Pyrophoric Material Spontaneous Combustion	Open Flame Flammables Combustibles Chemical Reaction
E-2: Explosion	Potential (pressure) Explosive Materials Chemical Reactions	
E-3: Loss of Containment or Confinement	Radiological Material Hazardous Material	
E-4: Direct Radiological Exposure	Ionizing Radiation Sources	
E-5: Nuclear Criticality	Fissile Material	
E-6: External Hazards	Non-Facility Events Vehicles in Motion Cranes	
E-7: Natural Phenomena	Natural Phenomena	

* *The E-number assigned to the accident categories is for ease of data management.*

** *The items in this column were selected for the hazardous energy and material source groups identified in the Nonreactor Nuclear Facilities: Standards and Criteria Guide (Ref. 5-4).*

As previously mentioned, the hazards identification process, as used for this DBIO, was comprised of three discrete steps: facility walkdowns/data collection, boundary identification, and defining activities to be evaluated. The next step involved screening out hazards for which further consideration or evaluation would not be required. Brief descriptions of how these steps were applied to this Building 707/707A DBIO are provided in the following paragraphs.

Facility Walkdowns

Facility walkdowns included physical and informational walkdowns (i.e., data collection). The data collection process included reviewing existing safety documentation [e.g., documents on the approved Authorization Basis Document List (ABDL), TSRs, FHAs], design/system drawings, specifications, technical standards, procedures, and other facility hazards identification documentation. This process also entailed interviewing and consulting facility system process operators, and SMEs. Physical walkdowns were conducted primarily to confirm information gathered in the data collection process and to identify additional areas of hazards identification concern. For this DBIO, both types of walkdowns (physical and informational) were used to direct, organize, and document the walkdown results. The information gathered from the walkdowns was documented in matrices or tables in the hazard evaluation process.

Boundary Identification

Identifying the facility boundaries greatly facilitates hazard identification and evaluation. Per DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear SARs* (Ref. 5-5), such boundaries can be selected based on individual unit operations, individual or grouped facility systems, specific functions, and/or physical boundaries within the facility. Appendix B of the PHA describes the specific hazards for Building 707/707A. For this DBIO, boundaries were designated based on a combination of physical boundaries and operations/functions.

Screening of Hazards

Screening of the identified hazards eliminated unnecessary consideration of material/energy types and quantities that are considered "common" industrial hazards. The screening process also identified those radiological and chemical hazards that are below established thresholds, thereby eliminating the need for further evaluation. The potential hazards identified from the checklist and screening processes were combined with the hazards associated with conducting specific activities. From this information, a complete set of hazards for Building 707/707A was developed.

The following screening process criteria was then applied to reduce the set of hazards requiring further evaluation.

SIHs Screening – Hazards that are routinely encountered in general industry and construction and for which national consensus codes and/or standards (e.g., occupational safety and transportation safety) exist, to guide safe design and operation are considered as "common." Common hazards that met the following criteria were identified and subsequently screened from further evaluation:

- The hazard is routinely encountered and/or accepted by the public in the home, home workshop, or public areas.
- Public consensus standards exist to control the hazard.
- No evidence exists that there are public or employee concerns about the hazard beyond normal prudence.
- The hazard is controlled by Occupational Safety and Health Administration (OSHA) regulations or one or more national consensus standards [e.g., American Society of Mechanical Engineers, American National Standards Institute, National Fire Protection Association (NFPA)], where these standards are adequate to define special safety requirements, unless in quantities or situations that initiate events with serious impact to the Public, the Workers, or the environment.
- Hazards such as noise, electricity, flammable materials, welding operations, small quantities of chemicals that would likely be found in homes or general retail outlets, and hazardous materials transported on the open road in Department of Transportation specification containers are considered to be common hazards encountered in everyday life.

Protection against common industrial and routinely accepted hazards is provided by practicing basic safety in the workplace and is generally handled through Site and facility safety management programs, policies, and procedures. Furthermore, in accordance with DOE-STD-3009-94, *Preparation Guide for U.S. DOE Nonreactor Nuclear Facility SARs* (Ref. 5-6), such hazards were not included as part of the hazards evaluation process, but were identified only to the extent to which they initiate or contribute to the events involving the radiological and/or chemical hazards that require evaluation.

Radiological Hazards Screening – Radionuclide inventories were screened using the screening quantity thresholds and methodology described in DOE-STD-1027-92 (Ref. 5-5).

This method was applied throughout all areas of Building 707/707A, 731, and 778. Any identified radiological hazards that were below the stated ratio were screened from further analysis. Identified radiological hazards not meeting the screening criteria were carried forward into the hazard evaluation.

Chemical Hazards Screening – Chemicals that required evaluation are those that are present in amounts exceeding the threshold planning quantity (TPQ) listed in: 40 CFR 355, *Emergency Planning and Notification* (Ref. 5-7); the threshold quantity (TQ) listed in Subpart C of 40 CFR 68, *Chemical Accident Prevention Provisions* (Ref. 5-8); or the TQ listed in 29 CFR 1910.119 *Process Safety Management of Highly Hazardous Chemicals* (Ref. 5-9). These TPQs and TQs are also listed in Appendix D of *SARAH*. Chemical inventory screening was limited to a review of chemicals introduced into the complex. No new chemicals, exceeding the criteria previously referred to, have been introduced into Building 707/707A since the time of the previous screening evaluation. The entire chemical inventory in the facility was screened as a common hazard. Therefore, no chemical hazards were carried forward into the hazards and accident analyses.

Although no further evaluation of chemicals was required, the chemical inventory still constitutes a potential hazard to the Immediate Worker if Site and facility procedures are not followed. Flammable chemicals were carried forward for consideration as potential initiators for fire/explosion accident types.

Once the screening process was completed, the results of the hazard identification process were documented in summary text and tables. The correlation of all identified (unscreened) hazards for each hazard type (i.e., as defined in *SARAH*) and their corresponding locations within Building 707/707A, 731 and 778 were included in the hazard identification documentation. Correlation of specific Building 707/707A DBIO Activities to the identified hazards was also included in the PHA summary tables and descriptions. Hazards identification documentation was then used as the starting point for the next step in the hazard analysis – Hazards Evaluation.

5.1.1.2 Hazards Evaluation

Hazards evaluation was the primary focal point of the Building 707 PHA and the starting point for the accident analysis and control set selection. Through the PHA process, the hazards and a comprehensive set of postulated accidents associated with the Building 707/707A DBIO activities were systematically and qualitatively/semi-quantitatively evaluated. The evaluation began with a comprehensive study of the identified hazards by applying the following evaluation processes:

- Building 707/707A hazards associated with Decommissioning activities were reviewed by Building 707/707A facility experts and safety analysts to develop a comprehensive list of postulated accident scenarios. Hazardous materials and energy sources were reviewed to determine possible interactions that could lead to accident conditions.
- Factors such as hardware, process materials, and decommissioning activities that could affect the initiation and progression of the accident conditions were identified and evaluated.
- Applicable safety documentation was reviewed and evaluated to identify potential events associated with Building 707/707A that may have been overlooked in the preliminary hazards analysis.

Following this study, the hazards evaluation process was completed with the development of specific events and scenarios that may lead to a hazardous release followed by the estimation of the associated frequencies and consequences based on potential interactions between hazardous materials and energy sources. In accordance with DOE-STD-3011-94, *Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans* (Ref. 5-10), the postulated events and accidents for Building 707/707A covered the spectrum for each hazard from small-consequence events to reasonable worst-case conditions. During the hazard evaluation, a comprehensive set of available operational controls and barriers were identified that would effectively prevent occurrence or mitigate the effects of identified hazards, events, and accidents. The primary activities comprising the hazard evaluation methodology include accident scenario selection and risk classification discussed in Chapter 6 of this DBIO.

5.2 PHA SUMMARY OF HAZARDS ANALYSIS

The PHA hazards identification and evaluation is documented in the PHA. The PHA hazard identification results are summarized in Table 5-3 in terms of those hazards not screened out and thus requires further evaluation. Using the hazards remaining after the screening process, the PHA hazards evaluation identified significant potential events involving those hazards including available preventive and mitigative controls. These significant events were then further evaluated in the accident analysis (Chapter 6) to establish the nuclear safety TSRs for the controls specifically credited to reduce frequency, consequence, and risk of accidents.

Based on the results of the PHA and the guidance provided in DOE-STD-1027-92 (Ref. 5-5), Building 707/707A is categorized as a Hazard Category 2 facility. The basis for this categorization is twofold:

- The 1999 Building 707/707A Facility BIO categorized Buildings 707/707A, 778, and 731 as a Hazard Category 2 Facility because of the radioactive material inventory [e.g., plutonium (Pu) and Pu Holdup] contained within the facility. Because the radioactive material inventory contained in the facility will not decrease to levels that will allow a hazard category reduction until the demolition phase of closure, and it is not cost-effective to perform a formal hazard categorization analysis, the hazard categorization of these buildings remains the same.
- In accordance with DOE-STD-1027-92 hazard category definitions and interpretation, Buildings 707/707A, 778, and 731 exceed the definition and interpretation for Hazard Category 3 but do not meet the interpretation for a Hazard Category 1 [i.e., Category A reactors or if designated as such by the Program Secretarial Officer (PSO)]. These buildings do, however, meet the interpretation for Hazard Category 2, in that they have "... the potential for nuclear criticality events or with sufficient quantities of hazardous material and energy, that would require on-site emergency planning activities..."

The *Site Preliminary Hazard Analysis* (Ref. 5-11) includes a qualitative assessment of the hazards involving the Immediate Worker in all facilities at the RFETS and the existing controls required to protect the Immediate Worker. In all cases it was determined that the available controls identified included portions of the Safety Management Programs (SMPs) in either equipment or programs. The Site PHA determined that the Immediate Worker is adequately protected by the Safety Management Programs against the general hazards analyzed. It was then left to the individual facilities to determine if there are any facility specific hazards which were not considered in the Site PHA. The Building 707 PHA did not identify any hazards or controls beyond those already identified in the Site PHA requiring designation as safety significant systems, structures, or components nor did it identify any administrative elements of the SMPs requiring elevation to a TSR level control.

TABLE 5-3. SUMMARY OF PHA HAZARDS IDENTIFICATION RESULTS

BOUNDARY	SCREENING RESULTS	HAZARDS EVALUATED
Outside Facilities	⇒ Buildings 709, 711, 711A, 718, and the Building 707/707A Outside Components were screened as SIH Facilities and require no further evaluation. ⇒ The actual levels of contamination within Building 708 are only slightly above minimum detectable levels and orders of magnitude below the most restrictive Category 3 threshold, thereby screening Building 708 from further evaluation. ⇒ Building 731 was evaluated identifying that the holdup measured within the building is much less than the Pu-239 Category 3 limit of 8.4 g (per *SARAH* and the *Nonreactor Nuclear Facilities: Standards and Criteria Guide*, Ref. 5-4). However, because the Building 731 MAR could be increased from accidents within Building 707/707A (e.g., draining from Building 707/707A plenum deluge system into Building 731 tanks), it was carried forward into the accident analysis.	***BUILDING 708*** *ELECTRICAL* – Three back-up diesel electric generators and associated support/distribution equipment; emergency motor control centers (MMCs/EMCCs) and electrical distribution center. *THERMAL* – Electrical equipment, fans, motors, and power tools; and hot work (such as welding, cutting, and grinding). *EXPLOSIVES, PYROPHORICS, SPONTANEOUS COMBUSTION, AND FLAMMABLES* – Three diesel tanks (50 gal, 450 gal, and 25 gal), a 4,000-gal tank external to Building 708 that provides fuel to the day tanks, the 711 cooling tower diesel pump 1,000-gal. tank, welding gas cylinders, mixed-waste drums, lube oil drums, and oil rags. *POTENTIAL & KINETIC* – Numerous confined pressure sources; rotating equipment (such as diesel generators, pumps, compressors, and so forth) and kinetic energy that can be released during catastrophic failures. *NUCLEAR AND HAZARDOUS MATERIALS* – Several waste drums containing Low Level radioactive waste and asbestos waste. *NATURAL PHENOMENA* – Vulnerable to natural phenomena hazard (NPH) events such as earthquake, winds, rain/snow, lightning, range fires, and freezing weather. *VEHICLE* – Internal equipment impacts (e.g., forklift and drum dollies); and external vehicle impacts (e.g., transportation trucks and aircraft). ***BUILDING 731*** *ELECTRICAL* – Electrical equipment such as pump motors, wiring, lighting, and so forth. *THERMAL* – Electrical equipment, fans, motors, and power tools. *EXPLOSIVES, PYROPHORICS, SPONTANEOUS COMBUSTION, AND FLAMMABLES* – None identified. *POTENTIAL & KINETIC* – Limited and considered insignificant. *NUCLEAR AND HAZARDOUS MATERIALS* – Process waste in waste tanks. *NATURAL PHENOMENA* – Vulnerable to NPH events such as earthquake, winds, rain/snow, lightning, and freezing weather. *VEHICLE* – Internal vehicle impacts (e.g. crane) and external vehicle impacts (e.g., transportation trucks and aircraft).

TABLE 5-3. SUMMARY OF PHA HAZARDS IDENTIFICATION RESULTS (continued)

BOUNDARY	SCREENING RESULTS	HAZARDS EVALUATED
Outside Facilities	⇒ The locker rooms and the Maintenance Shops for Building 778 were screened as SIH facilities and require no further evaluation. Though these areas contain hazardous energy sources, there is no potential for these hazardous energies to interact with chemical and/or radiological inventories greater than threshold planning quantities. The chainveyor section of Building 778 and the vestibule connecting Buildings 707/707A and 777 were screened here and require additional evaluation. This location contains, or may contain, radioactive materials and/or hazardous chemicals and energy sources to aid in the dispersal of the hazardous materials.	***BUILDING 778*** *ELECTRICAL* – Electrical equipment such as motors, electrical controls, wiring, lighting, and so forth. *THERMAL* – Electrical equipment, fans, motors, and power tools; hot work such as welding, cutting, grinding, and so forth is expected during the normal course of Maintenance shop operations; Belts, bearings, and so forth in the chainveyor and other equipment. *EXPLOSIVES, PYROPHORICS, SPONTANEOUS COMBUSTION, AND FLAMMABLES* – Pyrophoric materials; alpha decay of the radiological material; and flammable gases and/or explosive gases used in welding or thermal cutting activities during facility modification or closure. *POTENTIAL & KINETIC* – Rotating machinery, fans, compressed gas bottles, compressed gas bottles, and so forth. *NUCLEAR AND HAZARDOUS MATERIALS* – Residual radioactive contamination in chainveyor or material in transit through Building 778; Be holdup and asbestos insulation. *NATURAL PHENOMENA* – Vulnerable to natural phenomena hazard (NPH) events such as earthquake, winds, rain/snow, lightning, range fires, and freezing weather. *VEHICLE* – Internal equipment impacts (e.g., forklift and drum dollies); and external vehicle impacts (e.g., transportation trucks and aircraft).
Outside Facility	⇒ Building 732 contains no known significant quantities of hazardous or radioactive materials above contamination levels and below category 3 thresholds.	***BUILDING 732*** *ELECTRICAL* – Electrical equipment such as pump motors, wiring, lighting, and so forth. *THERMAL* – Electrical equipment, fans, motors, and power tools. *EXPLOSIVES, PYROPHORICS, SPONTANEOUS COMBUSTION, AND FLAMMABLES* – Explosive gases used in welding or thermal cutting activities. *POTENTIAL & KINETIC* – Pumps, motors, tanks. *NUCLEAR AND HAZARDOUS MATERIALS* – Laundry waste liquid in waste tanks. *NATURAL PHENOMENA* – Vulnerable to NPH events such as earthquake, winds, rain/snow, lightning, range fires, and freezing weather. *VEHICLE* – Internal vehicle impacts (e.g., crane) and external vehicle impacts (e.g., transportation trucks and aircraft).

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TABLE 5-3. SUMMARY OF PHA HAZARDS IDENTIFICATION RESULTS (concluded)

BOUNDARY	SCREENING RESULTS	HAZARDS EVALUATED
Entire Building 707/707A	⇒ The planned Building 707/707A Closure Activities potentially introduce radiological material and other hazardous material with energy sources capable of disbursing these materials. Many of these hazardous energy sources, such as electrical, thermal, and so forth are considered to be SIHs and would not warrant additional consideration. However, when combined with radiological and hazardous material inventories, these hazards must be evaluated as initiators of radiological/chemical accidents. Therefore, the hazards identified for Building 707/707A Closure Activities were not screened as SIHs and require additional evaluation	*ELECTRICAL* – Transformers, EGENs, switchgear, batteries, motors, electrical controls, and so forth. *THERMAL* – Electrical equipment; hot work such as welding, plasma arc cutting, and grinding during facility modification and closure; belts, bearings, and so forth; Cryogenic liquids used in assay; CO_2; Steam-line isolation. *EXPLOSIVES, PYROPHORICS, SPONTANEOUS COMBUSTION, AND FLAMMABLES* – Pyrophoric materials; alpha decay of Pu material; flammable gases and/or explosive gases used in welding or torch and plasma arc cutting activities during facility modification and closure. *POTENTIAL & KINETIC* – Rotating machinery, fans, compressed bottles; and air reversals or glovebox overpressurization during failure of ventilation systems. *NUCLEAR AND HAZARDOUS MATERIALS* – Residual radioactive contamination in the gloveboxes and equipment; Fissile radionuclides; radioactive waste drums; radioactive/hazardous material holdup in ventilation ducting and HEPA filters; asbestos insulation; Be holdup in ventilation ducting; and fissile material holdup in ventilation ducting. *NATURAL PHENOMENA* – Vulnerable to NPH events such as earthquake, winds, rain/snow, lightning, range fires, and freezing weather. ***VEHICLE*** – Internal vehicle impacts (e.g., forklifts and drum dollies) and external vehicle impacts (e.g., transportation trucks and aircraft).

5.3 REFERENCES

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